the tubule is situated near the duct as it enters the coil. Models from embryonic glands show that the coiled portion of the sudoriparous glands is developed by a folding and knuckling of the tubule, after the first loop is formed. In the circumanal region are found four quite distinct types of sweat glands: (1) Ordinary sudoriparous glands; (2) the large circumanal glands of Gay; (3) branched tubulo-alveolar glands; (4) a modification of type 3. A large axillary gland reconstructed consists of a single tubule measuring 30 mm. in length, much coiled and folded. In this region are also found branched tubulo-alveolar sweat glands. The glands of Moll are tubulo-alveolar glands, with relatively short but large secreting tubules presenting quite regular alternate enlargements and constrictions, from which arise a relatively small number of short tubules ending in large saccular alveoli. The ceruminous glands are similar to the glands of Moll.

FREDERICK C. NEWCOMBE,
Secretary.

DISCUSSION AND CORRESPONDENCE.

A QUESTION OF TERMINOLOGY.

IN his review in *Torreya* of the writer's recent university text-book, Professor L. M. Underwood criticizes severely the use of the termination 'ales' in class names, the special case cited being 'Anthocerotales,' which was used in conformity with the termination 'ales,' employed in the classes of the Pteridophytes, *e. g.*, 'Filicales.' Professor Underwood says: 'The name [Anthocerotes] is changed to *class* Anthocerotales, thus improperly using a termination reserved for a group of ordinal rank alone.'

Without referring to other botanists who have also sinned against Professor Underwood's rule, we should like to ask him to explain certain apparent inconsistencies of his own in this connection.

In the sixth edition (1900) of his little manual of the fern-allies, Professor Underwood uses (p. 65) the same names (Filicales, etc.) to indicate the primary divisions of the Pteridophytes that the writer does in the text-book criticized. Professor Underwood, however, calls these *orders* and not *classes* as they are usually considered to be. Looking for the corresponding class names, we find that Professor Underwood does not, apparently, recognize any classes of Pteridophytes, although he ranks the group as a whole as one of the four subkingdoms of plants. It certainly is not customary among either botanists or zoologists to consider the primary divisions of a subkingdom as of ordinal rank, and it is not quite plain how the employment of the termination 'ales' is sufficient to convert a recognized *class* into an *order*. All of the standard authorities consulted (*e. g.*, Coulter, Sachs, Scott, Warming, Van Tieghem, Vines) agree in calling the Filicales (or Filicinæ) a class; what reason Professor Underwood can give for reducing them to an order is not clear. He can scarcely claim that his 'order' Filicales is of equal rank with the order Marchantiales, for example.

Moreover, Professor Underwood is not as clear as he might be in distinguishing families and orders. Thus, on page 63 we find *order* Equisetaceæ, *order* Calamariaceæ; on page 65, *order* Equisetales; on page 126, *family* Equisetaceæ. A similar confusion is evident in the discussion of the classification of the other subkingdoms (pp. 56–58). Algæ and Fungi are divided into 'classes'; Bryophytes into 'groups'; Pteridophytes into 'orders'!

Perhaps Professor Underwood, as a professed systematist, will explain the principles upon which his classification is based.

DOUGLAS HOUGHTON CAMPBELL.
STANFORD UNIVERSITY.

THE EXPANSION OF A GAS INTO A VACUUM AND THE KINETIC THEORY OF GASES.

IN number 406 of this journal (for October 10) Mr. R. W. Wood calls attention to the fact that the subject of a communication presented by me before the chemical section of the American Association for the Advancement of Science at the last meeting and of which communication an abstract* under the

* The abstract was made without my knowledge and, although it is not bad, there are some loose statements in it. The full article will shortly appear in the *Journal of Physical Chemistry.*

above title appeared in SCIENCE for August 22, had been discussed long ago by L. Natanson in *Wiedemann's Annalen;* and he adds: "This same explanation [referring to mine], only in a much more complete form, was given by Natanson more than thirteen years ago."

I am glad to learn of the very interesting article which treats of the same subject and which was not known to me.

But the treatment and even the object of L. Natanson's article and of my communication are, contrary to Mr. Wood's opinion, widely different. Natanson treats the subject in an elaborate quantitative manner, leaving practically out of consideration the qualitative side of the phenomenon (*i. e.,* the question how it happens that the slow and quick molecules become separated), while I direct my attention only to its qualitative aspect, having attempted to form a simple idea of the mechanism of the phenomenon.

From a statement in his note I see that Mr. Wood misread the abstract; this made it difficult for him to understand its contents.

PETER FIREMAN.

WASHINGTON, D. C.,
October 16, 1902.

SHORTER ARTICLES.

BACTERIUM TRUTTÆ, A NEW SPECIES OF BACTERIUM PATHOGENIC TO TROUT.

THIS organism was obtained from the blood of diseased brook trout and stands in specific causal relation to the disease. The following characterization will be followed by a more extended description.

It is a pleomorphic form which appears in the blood and local lesions of its host as longer or shorter rods, with occasional spherical forms. The rods grow out infrequently into filaments of 6 μ, but average much less, and may be scarcely 0.5 μ in length. The width is 0.5 to 1.0 μ. On nutrient agar-agar it assumes the form of a spherical or subspherical coccus, with occasional rods, the cocci 0.5 to 1.0 μ in diameter. Microscopically the field gives the impression of cocci, but the rods are not infrequent and reach a maximum length of 1.5 μ. In liquid media rods greatly predominate, often arranged in pairs, of a length from that of the diameter of a coccus up to a maximum of 2.35 μ, and 0.48 to 0.83 μ wide. Many of the single rods, when stained, show a slight constriction indicating their separation into cocci, while many give no sign whatever of such a structure. Agar plates made from the blood contain apparently pure cultures of the organism as colonies chiefly of cocci, which become chiefly rods when transferred to bouillon, or when inoculated into trout. In the latter case they reproduce the disease, appear in the blood and lesions as rods recoverable upon agar as cocci. This pleomorphism in different media and the variety of form in the same culture are not reduced by repeated plating.

The organism is non-motile, does not form spores, and a capsule has not been demonstrated. It stains readily by aqueous solutions of the ordinary aniline dyes, and faintly by Gram's method, but its reaction with this stain is not of much value. It grows aerobically on ordinary nutrient media, luxuriantly on agar of a reaction* neutral or +0.5 to phenolphthalein, and will not grow or but very slightly at +1.5; at —0.5 growth is inhibited and at —1.0 to —1.5 scarcely occurs. On agar slants growth is moderately abundant, of a grayish-white color, with age grayish-brown. On usually the third day a production of a soluble pigment becomes evident, which diffuses itself in the medium and does not reside in the growth itself. It is a brown shade and deepens gradually, becoming very dark brown after two or three weeks, and the growth itself taking on a brown tinge. This pigment is produced in agar, bouillon, Dunham's pepton solution, and coagulated blood serum but not in gelatine or upon potato. It is produced in alkaline, neutral and acid media and is inhibited by extremes of reaction as the growth itself of the organism is inhibited. It is produced at the room temperature. Higher temperatures inhibit the color faster than they do the growth.

Agar plate surface colonies are round, slightly convex, outline well defined, microscopically granular, after two days grumose

* Report Committee of Bacteriologists, Journ. Amer. Pub. Health Assoc., January, 1898.